Remarks / Arguments & Status

The application presently contains the following claims:

Independent Claim #	*Dependent Claim #s*
1 (withdrawn)	2-12 (withdrawn)
13	14-19, 36-40
20	21-26, 41-45
27 (withdrawn)	28-35 (withdrawn)

Claims 13-16, 21-23 and 26 are amended, claims 1-12 and 27-35 are withdrawn and claims 36-45 are newly added. Support for the amendments are as follows:

Claim #13, from paragraph [0025] as originally submitted and from FIG. 1;

Claims 14-16, 21-23 & 26 are changes to dependency only; and

Claims 36-45, from claims 27 & 30-33 as originally filed.

35 U.S.C. §121 Restriction Requirement & Responsive Arguments

The examiner has issued a restriction requirement to one of the following inventions namely:

(I) claims 1-12 and 27-35, drawn to a polymer composite; and

(II) claims 13-26 drawn to a process.

The examiner indicated that restriction was proper in that the different inventions have different factions (perhaps functions?). It is respectfully submitted that the product which results from the inclusion of a chlorinated paraffin and the process by which it is made are truly searchable without any undue burden to the examiner. Naturally, products and processes have achieved different classifications, but the Office has never made this outcome determinative, having advanced that argument before the Board of Interferences and Patent Appeals, and not winning that argument for a different matter many years ago. When the examiner is looking for relevant Prior Art regarding the inclusion of chlorinated paraffins in the process, the examiner will inevitably be reviewing documents which discuss the products which are made by this process, thereby in essence simultaneously searching both inventions.

The applicant's attorney has respectfully complied with the examiner's request and provisionally withdrawn the polymer composite claims, reserving the right to amend the claim dependencies of the composite product claims if the examiner concurs with the applicant, said action in concurrence with the telephone conversation had with the examiner as noted in the office action.

In making this withdrawal of various claims, the applicant's attorney has reviewed the issue of inventorship as kindly suggested by the examiner and reaffirms that at least one claim remaining in the application is attributable to the inventive contribution of all named inventors. Therefore, no amendment of inventorship accompanies this amendment response.

35 U.S.C. §112 Rejection & Responsive Arguments

The examiner has rejected claims 14-19 and 21-26 under this section, subparagraph (b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The predicate for this rejection was the dependency of claim #14 which was not dependent from a process claim. Through amendment, the dependency of various claims has been revised to render this rejection moot.

35 U.S.C. §103 Rejection & Responsive Arguments

The examiner has rejected claims 13 and 20 under this section, subparagraph (a) as being unpatentable over *Goto et al.,* (US 6,274,248, hereinafter '248) in view of *Meyer et al.,* (US 4,467,077, hereinafter '077).

In the opinion of the examiner, *Goto* described a thermoplastic composite composition reinforced with mice (perhaps mica) and wooden fiber filler. The composite was prepared by extrusion or injection molding. The examiner indicated that the *Goto* reference did not mention the use of chlorinated resin.

In the opinion of the examiner, *Meyer* described a mica filled polymer resin composite. Special additives are incorporated, such as chlorinated paraffin (e.g., Chlorez 700).

The examiner concluded that it would have been obvious to include the chlorinated paraffin of *Meyer* in the composition of *Goto* in order to ensure greater uniformity in blending and resultant increase in mechanical properties.

The applicant's attorney has carefully studied the *Prior Art* patents identified by the examiner and respectfully disagrees with the conclusions drawn by the examiner regarding the teachings contained therein.

The following paragraphs articulate cogent reasons why the examiner may have misread those patents, or at least extrapolated their teachings beyond what they will support.

The primary reference used by the examiner is that of *Goto* '248. This patent teaches the combination of:

- a thermoplastic resin,
- mica, and
- wood filler.

When added in defined proportions, the composite material is indicated to have good flowability and which provides tensile strength, flexural strength and also better impact resistance.

The patent expressly represents that as taught in the *Prior Art*, it was not possible to simultaneously improve all properties.

> " As discussed above, in a composite material made from a mixture of an olefin series plastic and an inorganic filler such as talc or an organic filler such as a wood cellulose, the physical property exhibited in a product molded using the composite material is excellent in the tensile strength, the flexural strength, the flexural elasticity and the H.D.T., and such excellent properties can be easily provided for the product by controlling the amount and the size of the filler to be added. However, the impact resistance of the product is reduced. In other words, as improving the impact resistance, not only the physical property such as flexural elasticity and the like, but also the flowability of the composite material during a molding process are considerably reduced." (See col. 2, line 61 – col. 3, line 7)
>
> " This is because the physical property such as the tensile strength, the flexural elasticity and the H.D.T. is, in general, contrary to the impact resistance of the product and the flowability of the composite material during a molding process." (See col. 3, lines 8 - 12)

The solution to this problem was found by switching from talc and/or wood cellulose to mica! This is clearly taught by the patent in col. 4, lines 13-17, wherein it states:

> " Mica used herein is an important component of the composite material of the present invention, and the weight average flake size and the weight average aspect ratio thereof is a basis for achieving the effect of the present invention."

Therefore, the improvement in the characteristics is attributable to the geometry of mica, which as discussed in the patent, is flat.

> " In general, the shape of mica is flat, and it is known that mica is well dispersed in a meltage of the composite material during a molding process and is oriented along a surface of a product molded using the composite material (see FIG. 2) and is also known

> that the product made form the composite material containing mica is excellent in the tensile strength, the flexural strength, the flexural elasticity and the H.D.T. thus, less than 800 μm in weight average flake size, and 30-50 in weight average aspect ratio of mica is contained in the thermoplastic resinous composite material." (See col. 1, lines 28-39)

The patent expressly teaches that the shape of mica is flat and oriented along a surface of the molded product. The patent also expressly teaches that composite products made containing mica have excellent tensile strength, flexural strength, flexural elasticity and heat distortion temperature. (See col. 1, lines 28-39.)

It should be noted that all micas are composed of sheets of silicate tetrahedrons. These silicate sheets are composed of interconnected six-membered rings which are responsible for the six-sided pseudohexagonal symmetry. Each tetrahedron in the rings shared three of their oxygen atoms with three other tetrahedrons and all of the tetrahedrons in a given sheet point their unshared oxygen in the same direction. Thus, the structure of mica is stacked like a building with several different layers.

As admitted by the examiner, there is absolutely no mention of the use of a chlorinated resin anywhere within the four corners of the document. Therefore, the examiner sought to supplement the teachings of *Goto* with those of *Meyer*. However, before the teachings of *Meyer* can be combined, it is required that the examiner find "some teaching, suggestion, or motivation to combine the references." *In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998)*; cited favorably in *In re Daniel S. Fulton and James Huang, 391 F.3d 1195, 1200 (Fed. Cir. 2004).* The prior art as a whole must "suggest the desirability" of the combination. *In re Beattie*, 974 F.2d 1309, 1311 (Fed. Cir. 1992); cited favorably in *In re Daniel S. Fulton and James Huang, 391 F.3d 1195, 1200 (Fed. Cir. 2004).*

The *Goto* '248 patent does discuss various approaches which had been tried in the *Prior Art*, but none of those approaches a motivation to add a chlorinated paraffin resin. The first approach identified by *Goto* teaches the ability to improve impact resistance by undergoing a rubber-modification process which modifies the olefin into an ethylene-modified-polypropylene composite material. In that approach, the base polymer is modified and an <u>*inorganic*</u> material such as talc or calcium carbonate is added. See col. 2, lines 30-39 of '248. *Surely this is not motivation to add a chlorinated resin to achieve the effect of increasing flowability of the melt and improve physical properties, two normally antagonistic characteristics.*

The *Goto* '248 patent also discussed European Patent No. 0319589 in which a composite material is made from a mixture of a wood cellulose filler and an olefin series plastic and fiber flax. However, the this teaches that the flowability of the composite material melt is "considerably reduced" with this approach. See

col. 2, lines 40-50 of '248. *Surely this is not motivation to add a chlorinated resin to achieve the effect of increasing flowability of the melt and improve physical properties, two normally antagonistic characteristics.*

The *Goto* '248 patent also discussed Japanese Patent publication no. Showa 57(1982)-43575 in which a composite material of wood cellulose and an olefin series plastic and a natural or synthetic rubber is used in combination. However, this teaches once again that the flowability of the melt of this composite material during molding is considerably lower. See col. 2, lines 51-60 of '248. *Surely this is not motivation to add a chlorinated resin to achieve the effect of increasing flowability of the melt and improve physical properties, two normally antagonistic characteristics.*

However, for the sake of argument, assume that there is some justification to combine *Goto* with the teachings of *Meyer* '077, a point which is not conceded, but will be assumed for the purposes of fully responding to the office action only, the combination of these references will not supply the missing limitations found in the pending claims. *Meyer* teaches that mica-filled polyolefin resins composites may exhibit improved mechanical properties if the mica filler and polyolefin resin are combined with chlorinated aliphatic compounds. See *Meyer* Abstract.

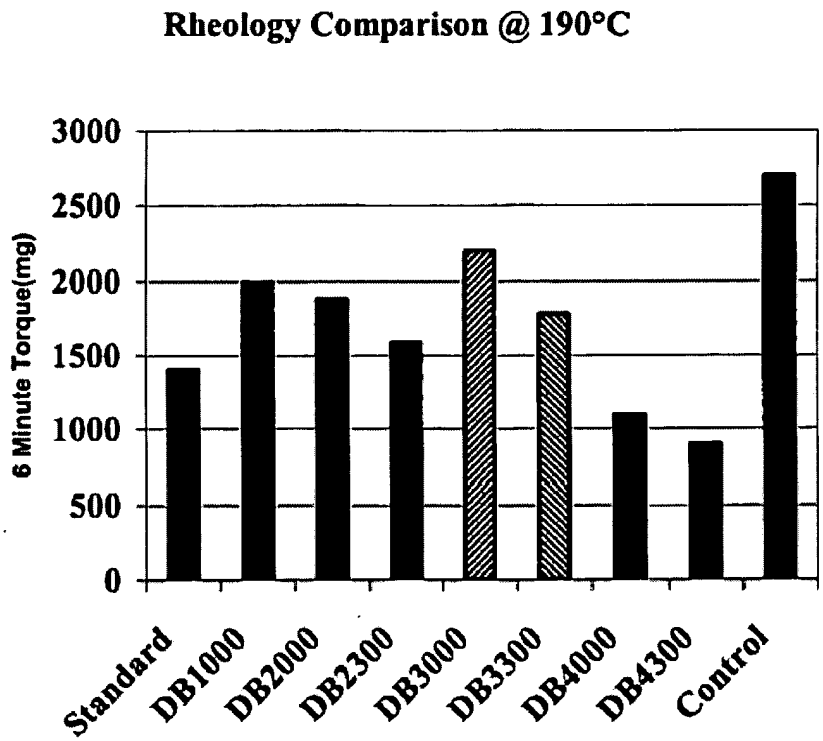
More specifically, *Meyer* teaches that at a minimum, 1 part mica is added to 9 parts propylene resin, (10% mica) which means that the increase in physical properties is attributable to the mica. As stated in *Meyer*, the additive which strengths the mica and polyolefin resin <u>*adhesion*</u> is employed in minor amounts, e.g., 0.05 to 10% by weight of the combined weight of mica and polyolefin resin. See col. 3, lines 23-27 of *Meyer*. At the 0.05% level of addition, the percentage of added mica remains at 10% and even when added at the 10% range, which is an additional 1 part, the amount of mica in the overall composition is 9%. The only logical conclusion is that the improvement in properties is attributable to the inclusion of mica. In fact, *Meyer* is completely silent as to any impact which may or may not have been achievable regarding melt flow as measurable by extruder torque. The teachings of *Meyer* leave this as an open question.

However, *Goto* does provide the answer. *Goto* was conversant with the *Prior Art* and presumably the teachings of *Meyer*, and *Goto* states:

> " As discussed above, in a composite material made from a mixture of an olefin series plastic and an inorganic filler such as talc or an organic filler such as a wood cellulose, the physical property exhibited in a product molded using the composite material is excellent in the tensile strength, the flexural strength, the flexural elasticity and the H.D.T., and such excellent properties can be easily provided for the product by controlling the amount and the size of the filler to be added. However, the impact resistance of the product is reduced. In other words, as improving the impact resistance, not only the physical property such as flexural elasticity and the like but also the flowability of a meltage of the composite material during a molding process are considerably reduced. See col. 2, line 61 – col. 3, line 7 of Goto.

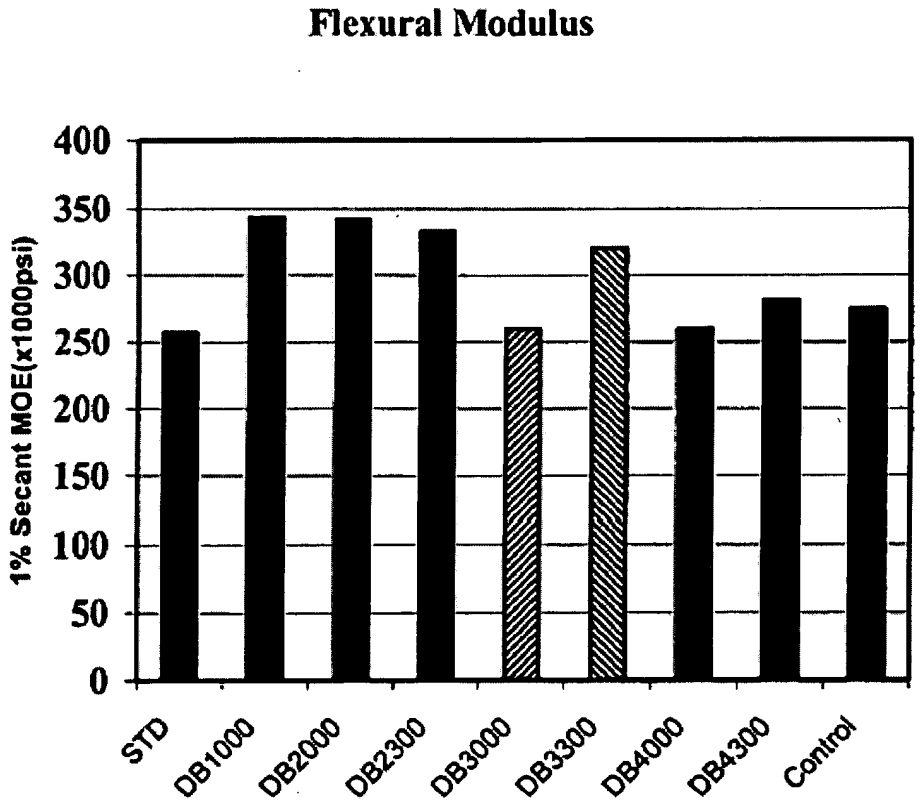
Therefore, *Goto*, with all of the *Prior Art* teachings available concluded that melt flow could not simultaneously be improved while still maintaining physical properties of the composite material. Even *Goto's* improved physical properties come at a weight percent of no less than 7.4% mica (obtained by combining 10 parts mica, the minimum amount required by *Goto*, plus 43 parts wood filler plus 82 parts thermoplastic resin). See *Goto* Abstract. The maximum amount of mica added is 38%.

Therefore, quite contrary to the conclusions drawn recently by *Goto*, *Fender et al.*, employed out-of-the-box thinking and in quite a contrarian manner to the teachings of the *Prior Art* was able to simultaneously reduce extruder torque (i.e., improve melt flow) and maintain or improve physical properties due to the inclusion of a chlorinated resin. This effect was achievable even without the addition of talc as illustrated in Table 1 as graphically illustrated in FIG. 1 when DB1000 (no talc) is compared to DB2300 (3% talc) or DB 3300 (3% talc) or DB 4300 (3% talc). In fact, dramatically, the largest decrease in torque was achieved when comparing the Chlorez® only formulation (DB 1000) with the control (no Chlorez®). This clearly indicates that the improved properties (increased physicals and superior melt flow) are due to the addition of Chlorez®. There is no mica in either of these formulations. There is no reference brought to bear on this issue by the examiner. This also cannot be due to any "inherency" in the addition, because *Goto* was explicit in stating that it was **NOT** possible to simultaneously improve both characteristics as taught by the *Prior Art*. *Goto* was an inventor in this field. He teaches away from the invention of *Fender et al.!*



Additionally, when *optionally* used in the applicant's invention, talc is employed in contrast to mica taught in the *Prior Art*. Talc is a magnesium silicate hydroxide of formula $Mg_3Si_4O_{10}(OH)_2$. As defined in Hawley's Condensed Chemical Dictionary, 9th edition (1977), with apologies to the examiner for the age of the reference dictionary, but it is respectfully submitted that the definitions of these materials have not changed in the intervening years, mica, as defined on page 580, a copy of which is included as Exhibit A, has a Mohs Hardness of 2.8 – 3.2 and is heat resistance to 600°C. By contrast, talc, as defined on page 835, a copy of which is included as Exhibit B, has a Mohs Hardness of 1 – 1.5. They are not the same material. It is quite understandable that the inclusion of mica will improve the physical properties but increase extruder torque (as taught in the *Prior Art*, as exemplified by *Goto*), but it is significantly less likely to lead one skilled in the art to conclude that the inclusion of talc will achieve the same or even similar results. The Mohs scale of hardness runs from 1 to 10, with talc the softest and diamond the hardest. Each mineral in the scale will scratch all those below it.

In looking at the results of physical testing on the flexural modulus of the same formulations above, it is clear that the addition of talc (DB 2300, DB 3300, and DB 4300), decreased the flexural modulus, which is precisely the opposite of what is desired when compared to the Chlorez® only formulation (DB1000).



Similar results are obtained by viewing FIG. 3 of the applicant's invention which illustrate tensile properties.

Therefore, regardless of whether it is applicable to combine the references as done by the examiner in the office action, or not, there is **no** teaching, certainly not singly, and additionally, not in combination (if properly combinable in the first instance) of the use of chlorinated resins to simultaneously decrease extruder torque (increase resin flowability within the extruder barrel) and to also increase physical properties of the resultant composite.

Goto uses mica of Mohs Hardness between 2.8 – 3.2 in combination with wood fillers. It should not be surprising that *Goto* increased the physical properties of the resulting thermoplastic composite. *Meyer* also used mica in his polyolefin resin to improve the physical properties of the composite and additionally did incorporate a chlorinated aliphatic. There is absolutely no teaching in either patent reference, of the ability to lower extruder torque, thereby increasing flowability of the composite resin, in all probability because there was no decrease in extruder torque.

Request for Reconsideration

Applicant believes that all independent claims clearly define over the prior art and that the distinctions between the present invention and the prior art would not have been obvious to one of ordinary skill in the art. Additionally, the remaining dependent claims, (including withdrawn dependent claims pursuant to the restriction and species election requirement) by the limitations contained in the base independent claims, are felt to be patentable over the prior art by virtue of their dependency from independent claims which distinguish over the prior art of record. All pending claims are thought to be allowable and reconsideration by the Examiner is respectfully requested.

As discussed in paragraph [0025] of the applicant's invention, "Through the use of the Doverbond® formulations, this coupling agent acts as a lubricant in that it: contains both internal and external lubricant systems, leading to a lowered viscosity of the wood flour and resin composite at processing temperatures; acts as a surfactant, providing a "wetting out" of the wood component for intimate contact between the wood flour or fiber and polymer; and improves adhesion by providing improvements in internal bond strength of the overall composite."

It is respectfully submitted that no combination of references teach this invention as claimed. It is also submitted that no new additional searching will be required by the examiner.

Fee Determination Record

A fee determination sheet is attached for this amendment response. The Commissioner is hereby authorized to charge any additional fee required to effect the filing of this document to Account No. 50-0983.

Conclusion

It is respectfully submitted that all references identified by the examiner have been distinguished in a patentably novel and non-obvious way. If the examiner believes that a telephonic conversation would facilitate a resolution of any and/or all of the outstanding issues pending in this application, then such a call is cordially invited at the convenience of the examiner.

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